

Willowrise Gardens

Permaculture Design Site

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Permaculture Design Course Final Project

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Mission Statement:

The mission of Willowrise Gardens is to create a forested landscape of food and other resources, and a joyful place for people to live, in the hopes that the land will be passed on for generations to provide our descendants a model of what is possible in their own landscapes, as well as a source of plants, food, and seed with which to build those landscapes.

Goals:

Goal 1: To design the perennial landscape such that if left and ignored for 100 years, people might return to find it still producing food and resources in abundance. I think we can get it to the point where the site would be ready for such an “ignoring” within thirty years.

Goal 2: To provide an abundance of perennial fruits and vegetables—preferably enough to meet the basic fruit and vegetable needs of a family of eight, with some to share. Ideally, we would reach this goal within ten years.

Goal 3: To have a lush food forest that looks like a thick, natural landscape. It is hoped that this will be the case within twenty years.

Goal 4: To become water independent as far as the landscape's needs are concerned—basically designed such that once fully established, the land won't require manual watering from the well. I anticipate this taking about thirty years.

Goal 5: To have a fun atmosphere for family to visit, including grandchildren someday; a place where camping can take place and feel as natural and fun as camping in the mountains. The aim is to have it at this point within fifteen years.

Goal 6: To produce sufficient wood on the property to provide all the heat for the home via wood-stove through the cold months. This will likely take at least thirty years—possibly closer to forty.

Goal 7: To develop a family burial plot where people can (if they choose) be buried at no cost, and loved ones who are buried here can have a tree planted on their grave as a memorial. Those wanting to be buried here will indicate what kind of tree (or bush, or whatever) they want on their plot. This should be able to be accomplished within 5-10 years.

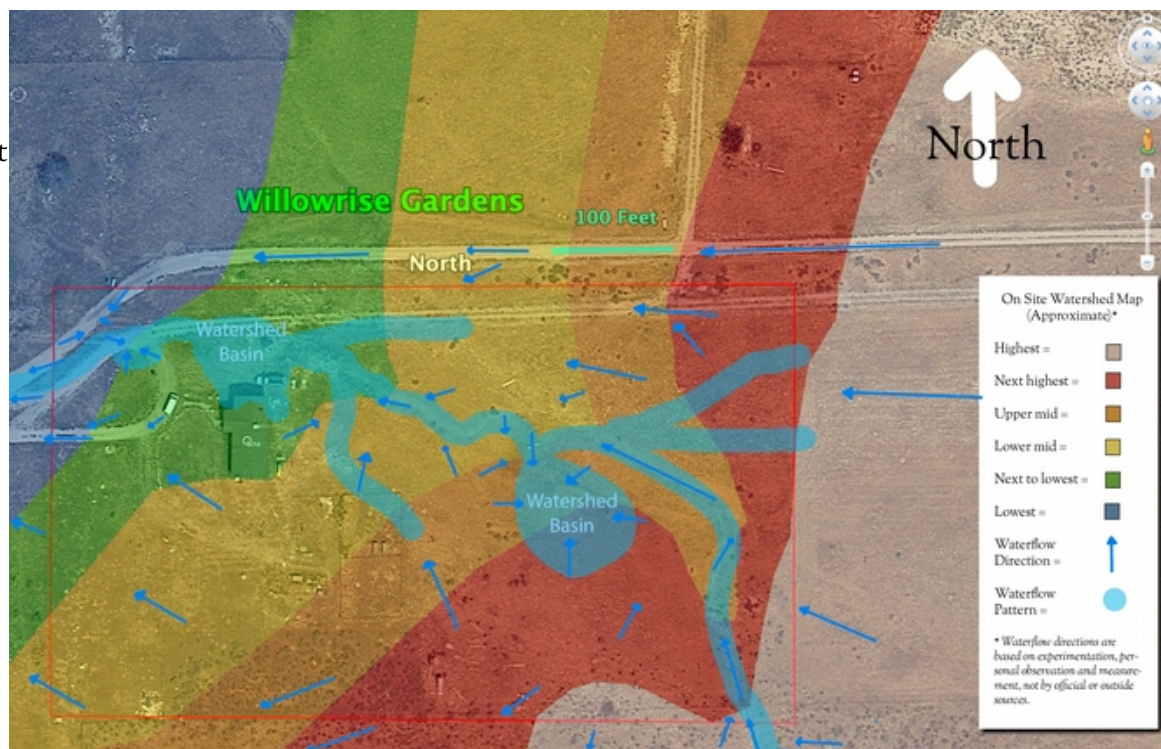
Goal 8: To develop a few passive energy harvesting systems to provide some of the electrical, hot water, and fuel needs of the house. We anticipate this taking about 15 years.

Goal 9: To find creative and enjoyable ways to make an income from the landscape. This should be possible within two years.

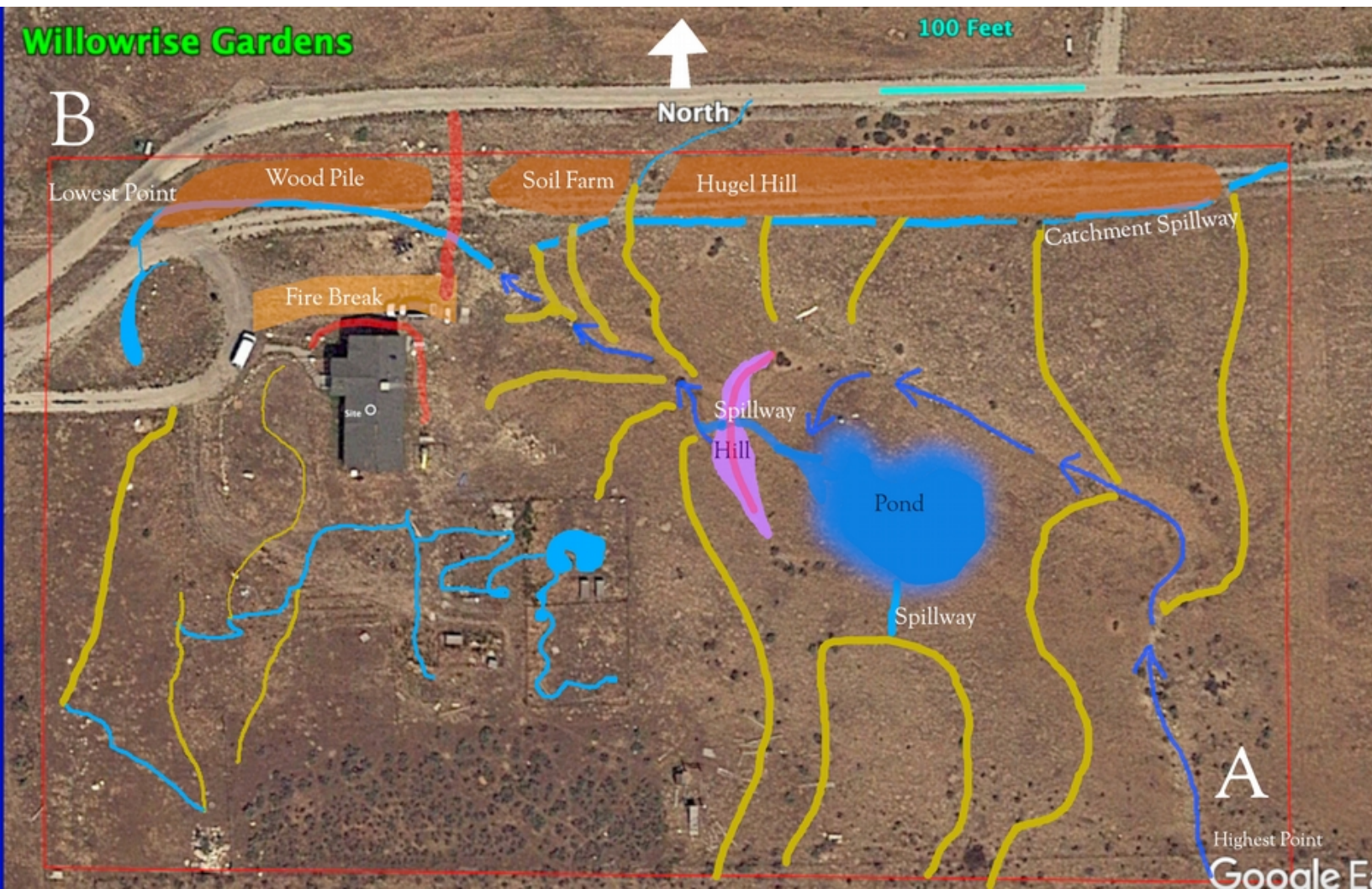
Goal 10: To provide an example of what can be done with sustainable agriculture locally, so that in teaching permaculture principles, I can point to our site and demonstrate what success can look like in this climate and location. This should be possible within three years, but will get better with each following year.

Water Flow

The way water flows on the site *presently* is as follows:



Once the full design is implemented, it is anticipated that the water will flow as follows:

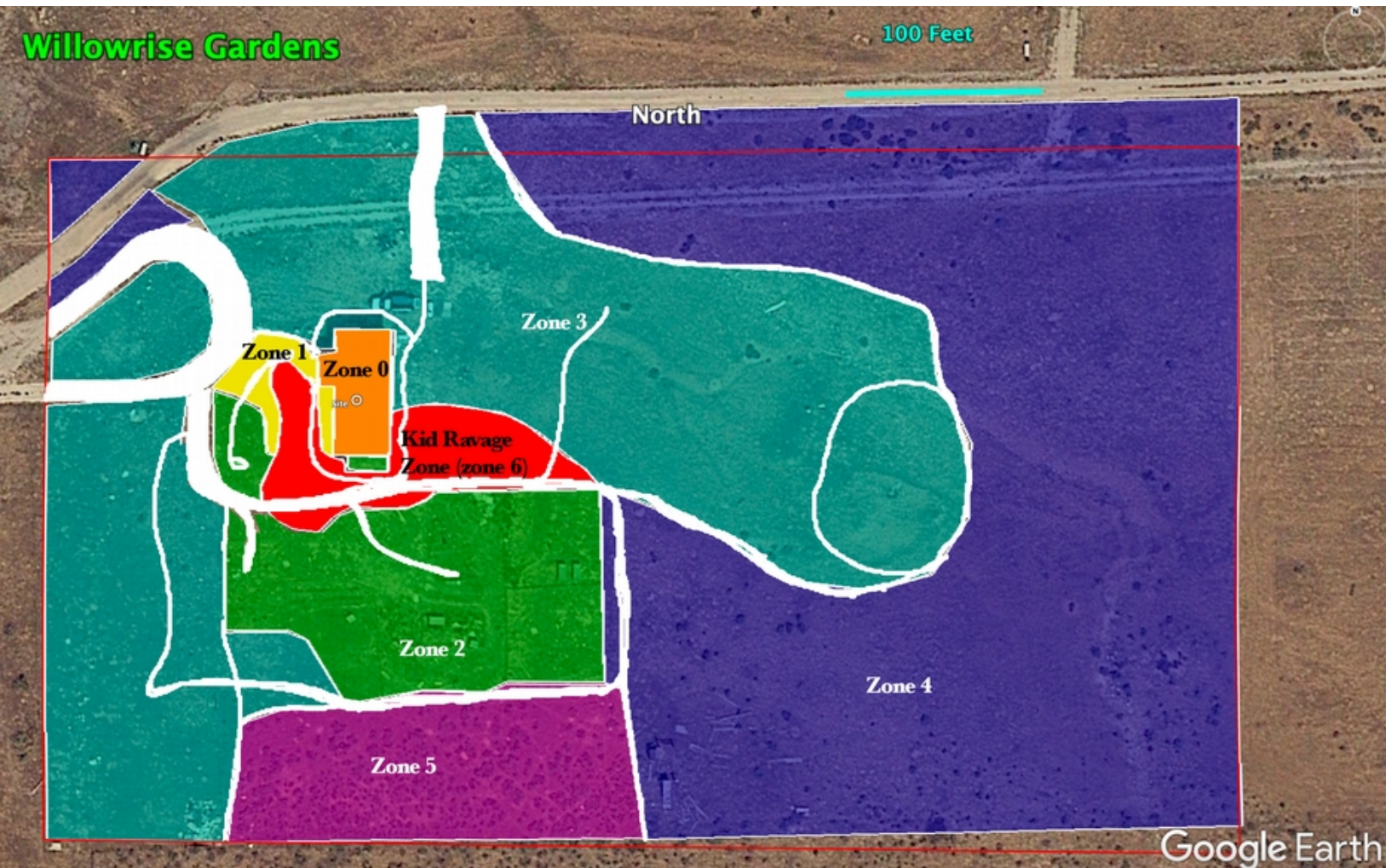


Dark blue lines: A natural runoff stream (completely dry, but probably once seasonally flowing prior to higher-elevation farms and croplands). The site runs from high point A to low point B. Yellow lines: Swales on contour. These will slow the water, and in the event of exceptionally wet runoff or flood, will divert water into pond or heavily planted water-way (blue arrows). These do not “flow” into the pond, since they are level, but if water rose high enough, they would spill into the next elevation level down.

Light blue lines: Water spillways intended to move overflowing water into the next swale, pond, or lower elevation water feature. Also representing water paths for flowing water to zone 2 trees when necessary.

New Zones and Pathways

In the new design of the site, it is anticipated that the zones will look like this:



White represents pathways, and zones are represented by the colors in which they are shown.

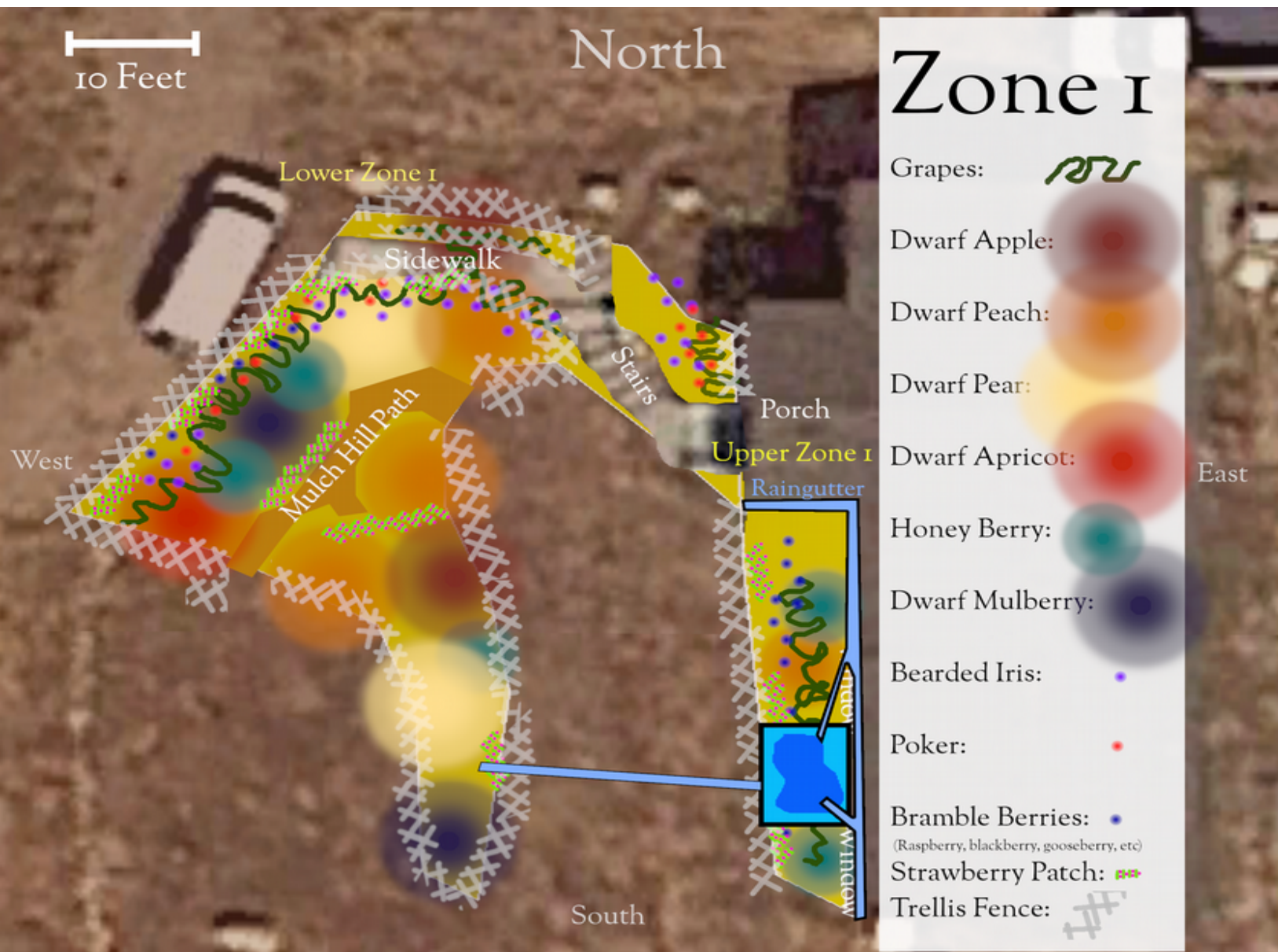
Zone 0: The Hathaway Hive

Though most of the house will be for family living, there will be plants adorning windows in the kitchen—most of which will be herbs, vegetables, spices, and other useful plants for kitchen/cooking.

Also, in the downstairs east-side is a garden room that receives a couple hours of direct morning sun. This will be used to sprout young plants, grow a few tropical indoor plants, and act as ferret housing for our ferret(s), who do the invaluable job of keeping the house clear of mice (and a marvelous job of it ferrets do, too—even better than cats). Most of the mice we've had in the past have been deer mice, come in on cold or wet days. Ferrets are also entertaining and playful.

In this garden room, a large planter (perhaps eight foot by eight foot, three foot tall) will hold a small indoor forest of all the indoor plants we can get in there, including lemon trees, herbs, tomatoes, pineapple, banana, etc.

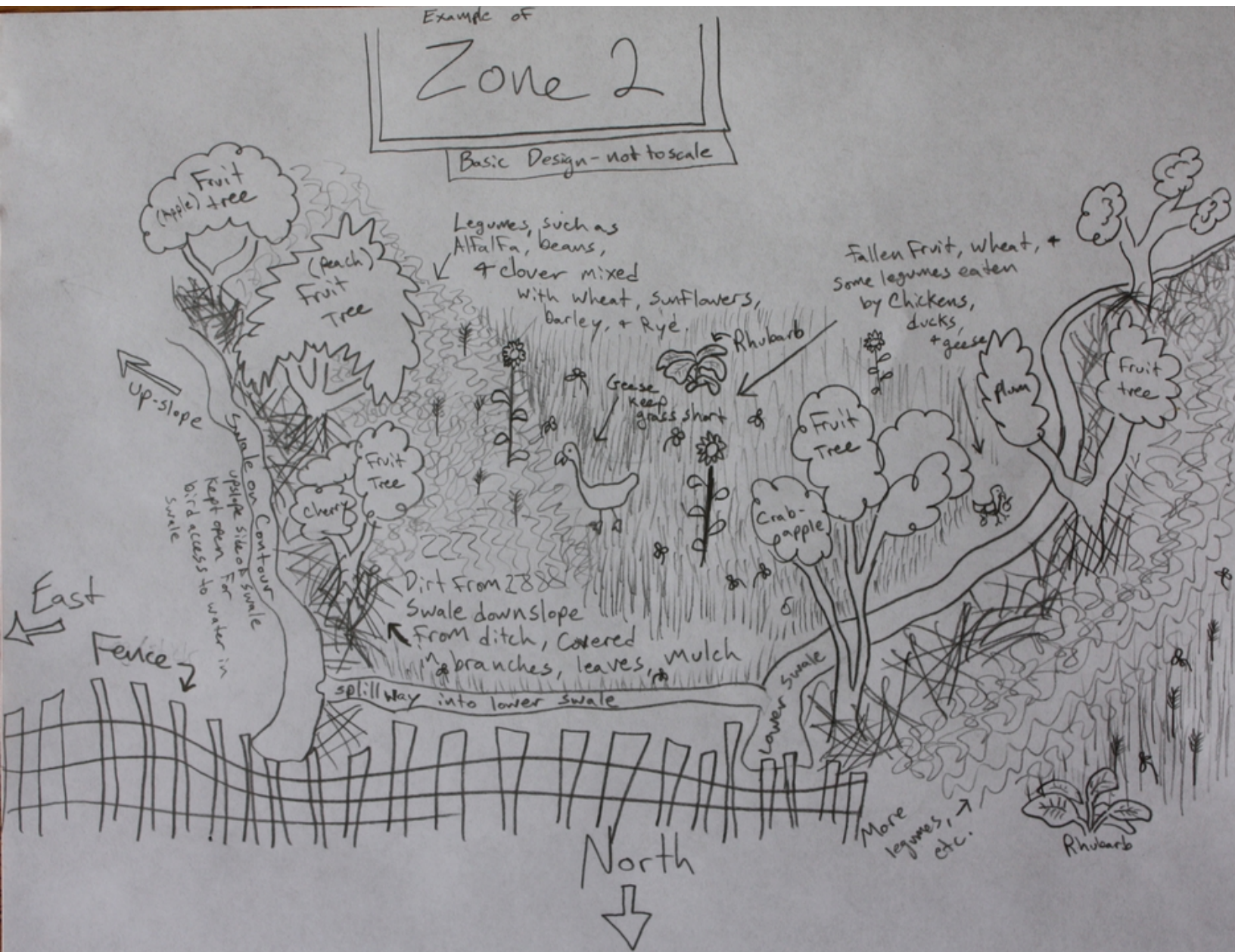
Zone 1: The Fruit Loop Snack-Track



Zone 1 is focused on easily reachable fruits blooming throughout all the growing seasons. The “loop” refers to this cyclical fruit system, where the first fruits may be ripe in May, the next in June, the next in July, etc. It’s to be a snack track, because nothing grows so high that fruit can’t be reached. There will be several dwarf fruit trees that will take careful pruning to maintain, but that pruning will also encourage fruit growth and robust size. It will be watered by roof catchment, and

will have a mulch path going through it, which will lightly feed the soil whenever it rains or snow melts. This area will be fenced well enough to keep all but the smallest or best-climbing animals out (especially children), but it is anticipated that there will be enough fruit growing through and over the fence to provide any passerby a tasty snack. The entire area will be sunken down 8-12 inches lower than the surrounding paths and zones in order to encourage water retention and some wind protection for small plants.

Zone 2: The Forest Orchard



This zone is also focused on fruit trees, though these trees will be encouraged to be large and produce in abundance. These fruits will be not only for personal/family production, but for income. Thus great variety will be encouraged in order to provide both likeliness of some successes with each season, as well as more product for potential customers. Trees will be planted approximately ten feet apart to ensure enough successful trees, but if necessary, some trees may be pruned back, moved, or compassed to make way for hardier, better bearing trees. Some such "duds" may be pruned small enough to be reachable by domestic birds as forage. However, it is anticipated (from prior failures) that only a few trees out of every ten will survive long enough to

become real fruit trees, and dead trees, as well as patches where fewer trees survive, will be planted with more fruit trees.

Leguminous herbs such as alfalfa, clover (especially *Trifolium pratense*), and various beans will be planted in thick patches to provide nitrogen to fruit trees. These legumes will also act as protein forage for the 10-15 birds (chickens, ducks, and geese) free-ranging on the property. Russian thistle will be encouraged to grow immediately around the base of the tree for its ability to provide a thick, thorny “fence” around the base of the tree to protect from scratching talons and nibbling beaks. Though the birds don’t tend to do major damage to the trees, Russian thistle ensures they give it a wide berth. Russian thistle will stay until the new generation grows through it, strengthening and reinforcing the barrier.

This zone will also have several wikiups for animal housing/shelter, and vines such as Virginia creeper, grape, and everlasting sweet pea will be encouraged to climb and engulf these wikiups, reinforcing their shelter and providing shade and windbreak for the domestic birds.

Sunflowers and Jerusalem artichoke will be grown throughout zone 2 to provide seed for bird (wild and domestic), and the Jerusalem artichokes will provide food tubers for people.

Zone 2 will also have hugel hills (hills of buried wood), and several small ponds (between three feet across and 20 feet across), used both for goose/duck needs and to water trees. Most tree plantings will follow micro-swales on contour (maybe a foot deep and a foot tall), and organic material will be piled on and around the swales. Runoff from duck and goose ponds will run into these swales, feeding the trees with their watered-down manure.

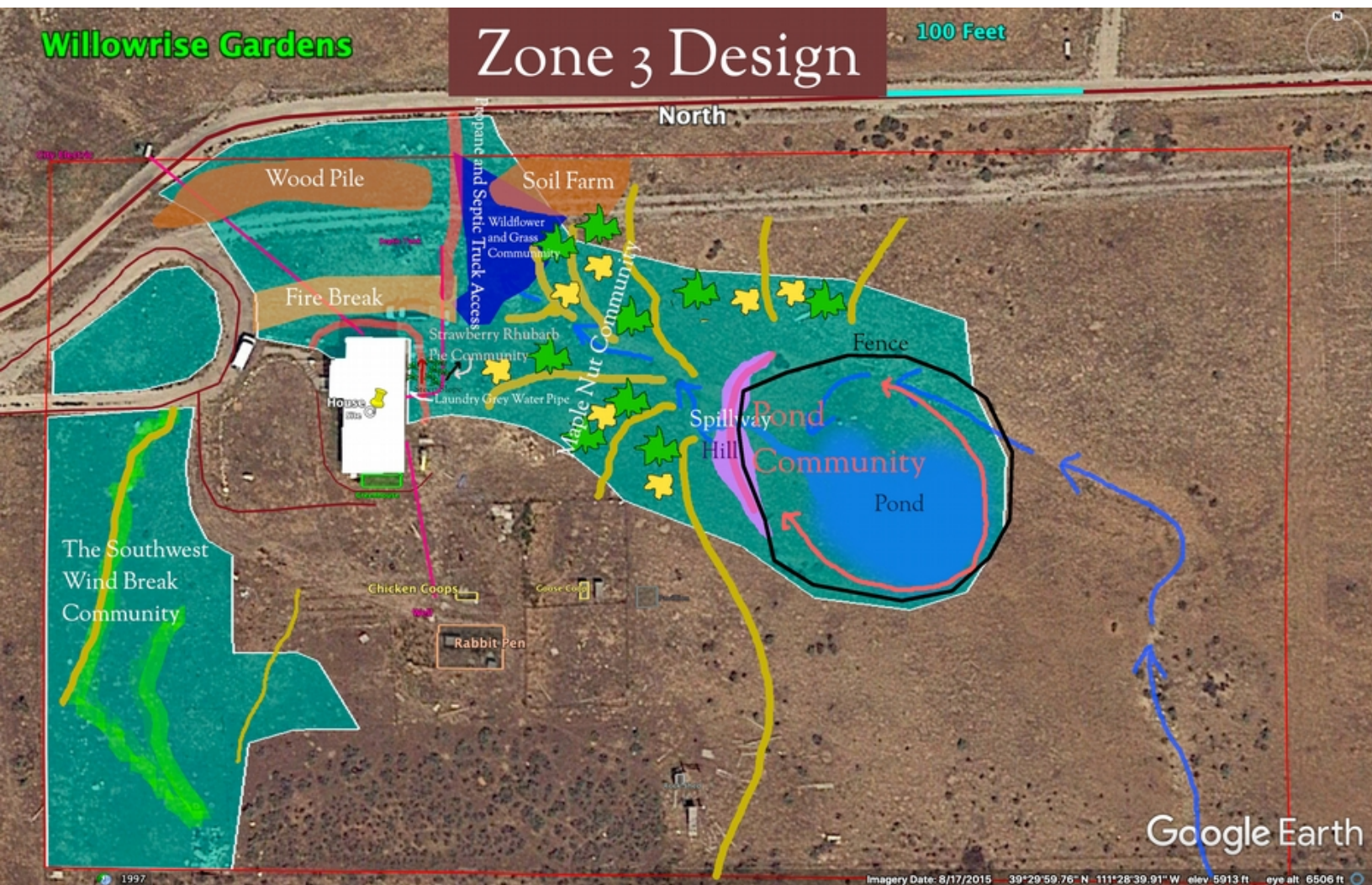
In the areas of the zone less trafficked by birds, raspberry, gooseberry, currant, elderberry, and other bush/vine berries will be planted. These will need protection until established, since birds will eat the whole plant while it’s young.

Also included in zone 2 will be a protected (fenced off from chickens) hardy vegetable garden, with deep green veggies such as chard, leafy mustard, beets, carrots, parsley, radishes, lettuce, cabbage, garlic, and onion. The idea is to grow potentially self-seeding biennials, from which we will gather some seed to plant the following year, as well as to spread into wilder areas for passive, wild veggie harvesting.

Zone 3: The Communities

In general, zone three will have hardy larger trees, and the yield focus will be nuts, saps, and perennial vegetables. Rhubarb will line slopes and open areas throughout the zone, along with wildflowers, garlic, leeks, and other hardy, low-layer species, both to invite pollinators, detract harmful insects, and provide a pleasant atmosphere and harvestable yields of food scattered throughout.

A fire break will be kept free of flammable plant life, but used for firewood preparation in the winter (chopping, etc).



Zone 3 encompasses several plant communities, including:

The Southwest Wind Break Community:
Where willows, honey locusts, lilacs, and several



smaller species will keep the worst winds from drying out the land too quickly in the spring and summer.

Wildflower and Grass Community

This community will include a mix of wheat, rye, oats, flax, daffodils, jointed goat grass, barley, corn, sorgham, and other hardy grasses and wild flowers. The goal with this community is to grow harvestable grains that can eventually grow with little to no watering needs.

The Strawberry Rhubarb Pie Community:

Here there will be strawberries, rhubarbs, dill, raspberries, blackberries, and rosemary will grow on a somewhat steep hill right up next to the house on the east side facing north. These will be watered primarily by grey water coming from the laundry washer (Dr. Bronner essential oil soap for detergent).

Pond Community

This community will include cattails, horsetail, water cress (*nasturtium*), wild rice, onions, clumping bamboo (*Phyllostachys decora*), and chamomile, each either in, touching, or nearly touching the water's edge. Slightly uphill of the pond, where water does not touch, but does wick a little, will be planted asparagus, radicchio (on south facing slope), broccoli, rhubarb, garlic, basil, rosemary, raspberries, and dill.

Maple Nut Community

Along the central swales, down the spillway from the pond and pond community, walnuts, almonds, chestnuts, maples, box elders (as well as other maple species trees), will be planted. Careful protection of these species will have to be maintained in the early years of these trees, because they won't likely be fully fenced off from deer. Most of these will be planted below or in swales in order to get the water they need.

Zone 4:

Zone 4 will be designed to emulate the natural, local landscape where untouched, mature ecosystems reside. It will include mostly large, woody trees, including firs, pines, aspen, and other large species that grow in this region naturally. The idea of this zone will be to emulate the local landscape in both appearance and species—but with just a hint of bias towards the more useful of the local species. Before the system matures (hopefully developing into a mature forest), local wildflowers, bushes, herbs, and ground covers will be used. The placement of individual elements will be based on observations of local wild forests and mountains—observations that take into account water flow, slope, solar aspect, soil type, water access, etc.



Zone 5:

Zone 5 is the zone where I have opted to do nothing but protect, observe, and very lightly harvest from it. It will basically be left alone to see what nature does with it without the input of a gardener or designer. If seed, roots, or other plants from other zones move in, they will be left alone. If a badger moves in, I'll not bother it. This will be the zone used for observing and learning what nature does so I can mimic it in other zones.



Zone 6:

This is the kid-ravage zone. For the most part, this zone will not be designed for. Flat, hard, dirt, most likely. Rocks would get scattered, thrown (through the greenhouse windows), and kicked around, as would any



other abundant substance (wood chips, etc). Concrete *could* be laid here, but kids hurt themselves on concrete (sigh). When our kids move out, and ravaging won't be every single day, we'll probably plant grass there. For now, we'll stick with dirt. Plus, our kids love dirt—digging in dirt, rolling in dirt, putting dirt in their hair... you know, normal kid stuff.

Use of Permaculture Principles

Permaculture Principles

How Willowrise Gardens is Implementing the 12 Permaculture Principles:

1. **Observe and interact**

During my first year on the property, I did very little planting, and a LOT of observing. With each passing year, I've tried a few more things, and observed the results. The most dramatic and successful results act as feedback to create more of the same effect elsewhere on the site.

I've noticed that I have to be working in the yard for about a half-hour before the animals and wildlife will really start ignoring me, so I try to schedule my work such that I can be out there at least 45 minutes as often as I can. While 15 minute bursts may serve to "get things done," they don't allow for real-time observation of how the animals, weather, and landscape interact with each other, and me. I can tell I'm doing it right when wildlife comes close to me, noticing but ignoring me, and I observe but don't react. Yes, I could chase the deer away from my garden patch, but by allowing and observing, I discover ways to adjust the system to prevent them getting into it at all. After all, if I can only keep them out while I'm in the yard, the yard will be devoured whenever I'm not home.

As for plants, I try to record in a journal any observation I can, since it may be useful information later.

Example: *March 6, 2019, first filaree (Erodium cicutarium) growing under newly melted snow observed.*

Over several years, such observations will be able to be mapped, calendared, and act as incredibly effective indicators of seasonal tendencies, etc.

2. Catch and store energy

Water:

Water is to be caught passively through on-contour swales, catchment ponds, and rooftops.

It is to be stored first in the soil, then through ponds, then through about 2,500 gallons-worth of water storage containers. These storage containers are filled primarily by roof water runoff.

Heat:

House-heating: The house will be heated via wood-burning stove, and much of that wood (hopefully eventually all) will be supplied by tree branches pruned on the property. Also, neighbors bring pruned branches from their trees to our property instead of the local dump. These are used for getting tree clippings for rooting, fencing, animal shelter wikiups, chipped for organic material, and/or cooked for heating. Prior to use, these branches are placed in dry, overgrazed areas to be stored until needed for use.

Thus their presence can increase the natural fertility of those overgrazed/degraded area.

Water-heating: Some water, stored in water barrels (such as 55 gallon drums) will be painted black, and cycled through black hoses that sit in daytime sunlight to be heated by the summer sun to facilitate afternoon or evening baths in order to reduce the need for propane water-heating.

Some water will also be heated via can/heat-safe bag attachments on or against wood-burning stove in winter to supplement water-heating.

Sunlight: Sunlight will be first harvested via photosynthesis in plants, but secondarily harvested via solar panels feeding a solar battery to reduce electric costs of the home.

3. Obtain a yield

Fruit: With hundreds of fruit trees of as many varieties and species as possible, as well as vines, bushes, and herbs, it is hoped that fruit (including berries, grapes, tree-fruits, etc) will be abundant.

Vegetable: with thousands of perennial vegetables that are well-chosen for the site, it is anticipated that we will obtain a high yield of vegetables.

Wood: Wood will be harvested on the property from large, woody trees, for fence and building material, for chop-and-drop mulching, for structures, for wildlife habitat, and for the wood-burning stove.

Animal: Through breeding, ducks, chickens, and geese will be raised on site, used (occasionally) for meat, and regularly kept for egg production. As the system approaches climax and/or stabilizes, it is anticipated that this will cost nothing in money, but may actually provide supplementary income as we sell our excess in birds, meat, and eggs. In addition, bugs, slugs, snails, and other less-desired creatures produced on the property will become chicken feed.

4. Apply self-regulation and respond to feedback

In order to maintain some semblance of stability, careful attention will be paid to ensure that excess of any yield or population does not exceed its use in the system. For example, if too many chickens hatch in a year, they will be either sold, harvested for meat, or traded for other needed goods, so they don't grow to maturity and devour other parts of the system. Whenever possible, overabundance will be either be sold, freely given, or fed back into the system in some way. For example, overabundance of fruit that cannot be sold will be stored via bottling/canning, dehydrating, mulch, compost, worm-farming, chicken scraps, or planted to start new trees. More successful efforts to recycle will be used more often. Notes and calendaring will be kept to see that we are constantly learning, and adjusting according to the feedback received.

5. Use renewable resources

A major focus is to be placed on using materials that can be fed back into the system. Everything from the type of pots used for planting to the kind of bags used when grocery shopping will be taken into consideration. Anything that inherently produces waste (such as heavy synthetics that can't be reused) will be examined carefully to see if there are alternatives to the product. Milk cartons, for example, may be preferred over milk jugs, as they can be used in worm-bins, fireplace kindling, craft projects, or compost.

The goal here will be to have everything that comes in feed the system, and very little go out.

6. Produce no waste

(see #5)

7. Design from pattern to details.

Though only partially addressing the concept, many of the details designed into the Willowrise Gardens site are based on larger patterns observed in the wider landscape. For example, while there is little water runoff along ground surfaces where wild grasses and brush grow (most of it comfortably soaks into the surface—which we want), there is a great deal of water that flows down the road that runs parallel to the property as snow runoff. Potentially thousands of gallons of water flow down the hard-packed muddy road during this wettest snow-melting season. So in our design, several yards (enough that cars will scarcely notice the change) of the

road will be “swaled” to subtly divert the water onto the site, down into a ditch that drains into a larger swale, causing thousands of more water to soak into the soil than would otherwise occur.

Another pattern observed is that about 50% of all wind comes from the west, most commonly in the spring. As such, the design includes a thick windbreak that will not act as a wall to stop the wind, but rather a ramp to encourage the wind to divert to above the site. And in order to even better prevent heavy eddies in the wind coming down over the windbreak, taller, more porous trees, interspersed between the thick windbreak trees, will be nitrogen-fixing trees to act like a porous screen to soften even the wind that makes it over the windbreak.

8. Integrate rather than segregate

Willowrise Gardens is designed to integrate as many types of plants of as many plant families as possible in order to maximize the potential benefits each species provides for the others, while being careful not to jeopardize some species by planting them with or near other species that may be detrimental to it. Companion planting and plant guilds will be a major part of the system. Also there will be areas for heavy experimentation to see (aside from what can be found by studying the work and experiences of others locally and on the Internet) to discover which plants do especially well together. Basically in any given zone or area of the site, there will be experimental “pockets” where ideas and experiments can be tested. Based on the observations made, more successful combinations will be used more widely. Such experimental areas will be called labs, so for each zone, there will be designated labs (zone 1 lab, zone 2 lab, etc).

9. Use small and slow solutions

Since the primary objective of Willowrise Gardens is the establishment of a fruitful food forest, care will be taken to set up passive water harvesting areas for all tree areas, providing for an ongoing water solution. Some of these trees will be grown for the express purpose of paving the way for other plants, animals, or building projects to occur. Such implementations will take time to erect, time to plant into, and time to grow. That’s why it’s anticipated the fully climactic system desired will take about 30 years. The intent is not to make it all happen now, but rather to plug through slowly in order to allow learning, observation, needed work, and receiving of feedback to occur.

10. Use and value diversity

It is my observation that in nearly any square foot healthy patch of green ground you will find at least seven species of plants and/or fungi. Willowrise Gardens uses that guideline as a goal: that in any square foot, seven or more species can be found—with the obvious exception of the trunk of a large tree, a boulder, and so forth. Weeding will not normally be done. If there is an unwanted species in an area, that species will be replaced by either something that fulfills the same function, or is a more desirable species of the same family. For example, if bindweed becomes persistent in an area, we will assess the reason (is it filling in newly broken soil? Covering scorched ground? Etc), and then replace it with either Morning Glory or some kind of hardy ground cover, such as clover, alfalfa, or thyme.

Wherever possible, in every zone, there will be at least seven species from different plant families. This will ensure great variance in the potential functions of each species. Effort will also be made to allow plant species that fill each permaculture layer (canopy layer, vine layer, etc).

Also, rather than destroying hardy useful “invasives,” place will be made for their growth, and education will be obtained regarding their usefulness, in order to maximize the yields of plants that will grow without effort on my part. I’m a big fan of valuing the marginal, finding the value in what is already readily available, and finding ways to obtain yield from them.

11. Use the edges

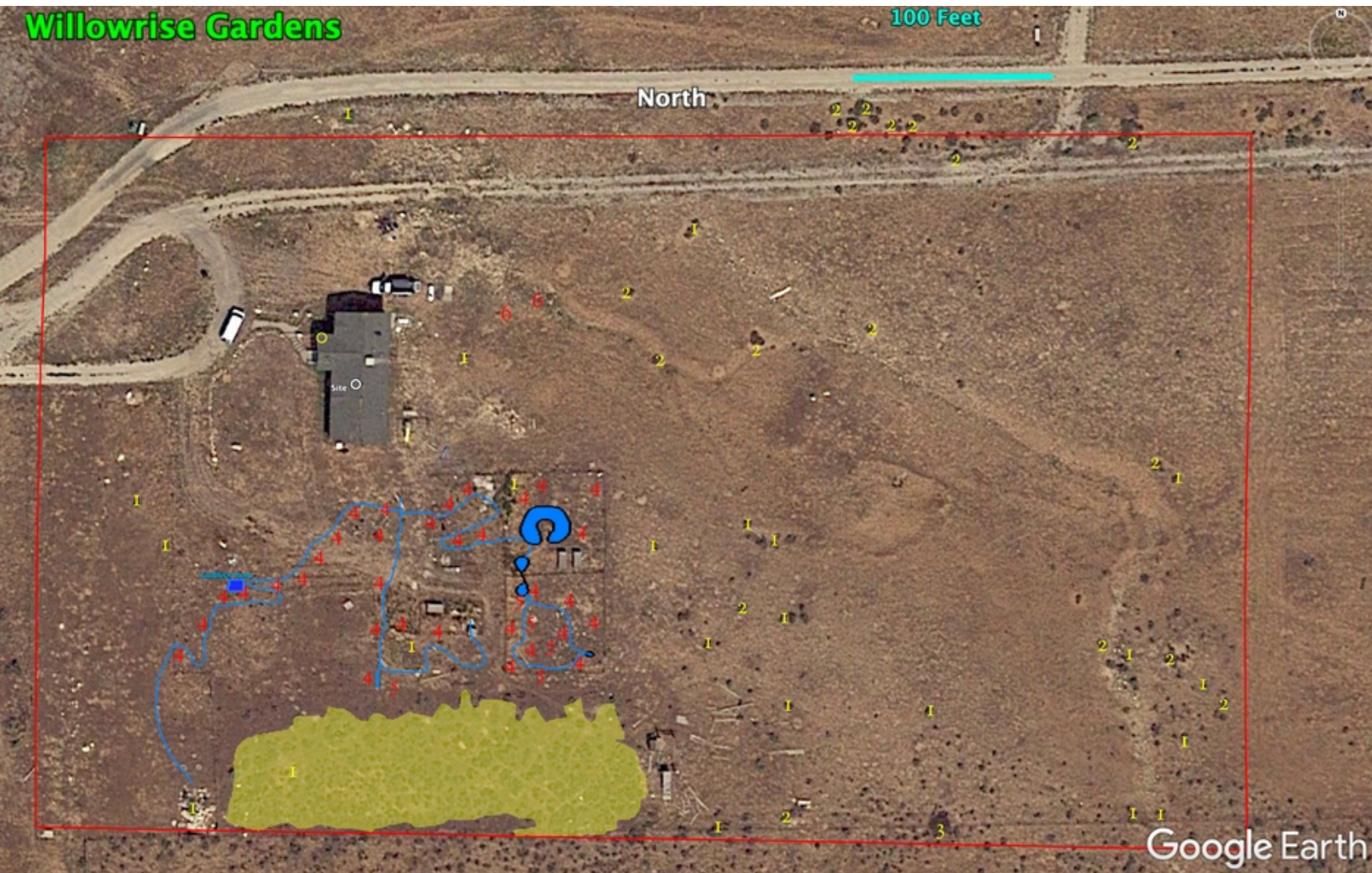
In order to maximize the opportunity for edge effect, Willowrise gardens will have great variance in ground shape, elevation, and structure. Small, long, or oddly shaped ponds will dot the landscape. Places will be made for rock gardens, hills, dips, ditches, and various structures will be placed to increase the number of microclimates and potential wildlife habitats.

12. Creatively use and respond to change

As mentioned earlier, each zone will have lab areas for experimentation and experiential education. As new events take place (a surprise flood, a particularly dry season, a random tornado or other natural disaster, notes will be taken about what happened, it’s effect, before and after photos (where possible), and the year-after results. Most of this will be done electronically in order to ensure the ability to backup the observations and learning, but will be annually printed as journals that can be studied, examined, investigated, and learned from for decades to come.

Vegetation:

In this graphic, yellow numbers are representative of plants that were on the property already when we arrived four years ago. Red represents plants we've already planted (which have survived—there have been dozens that have died already), and green represents plant we intend to put in.



Existing Vegetation:

The vegetation existing on the property in a mature state (it was here before we arrived three years ago):

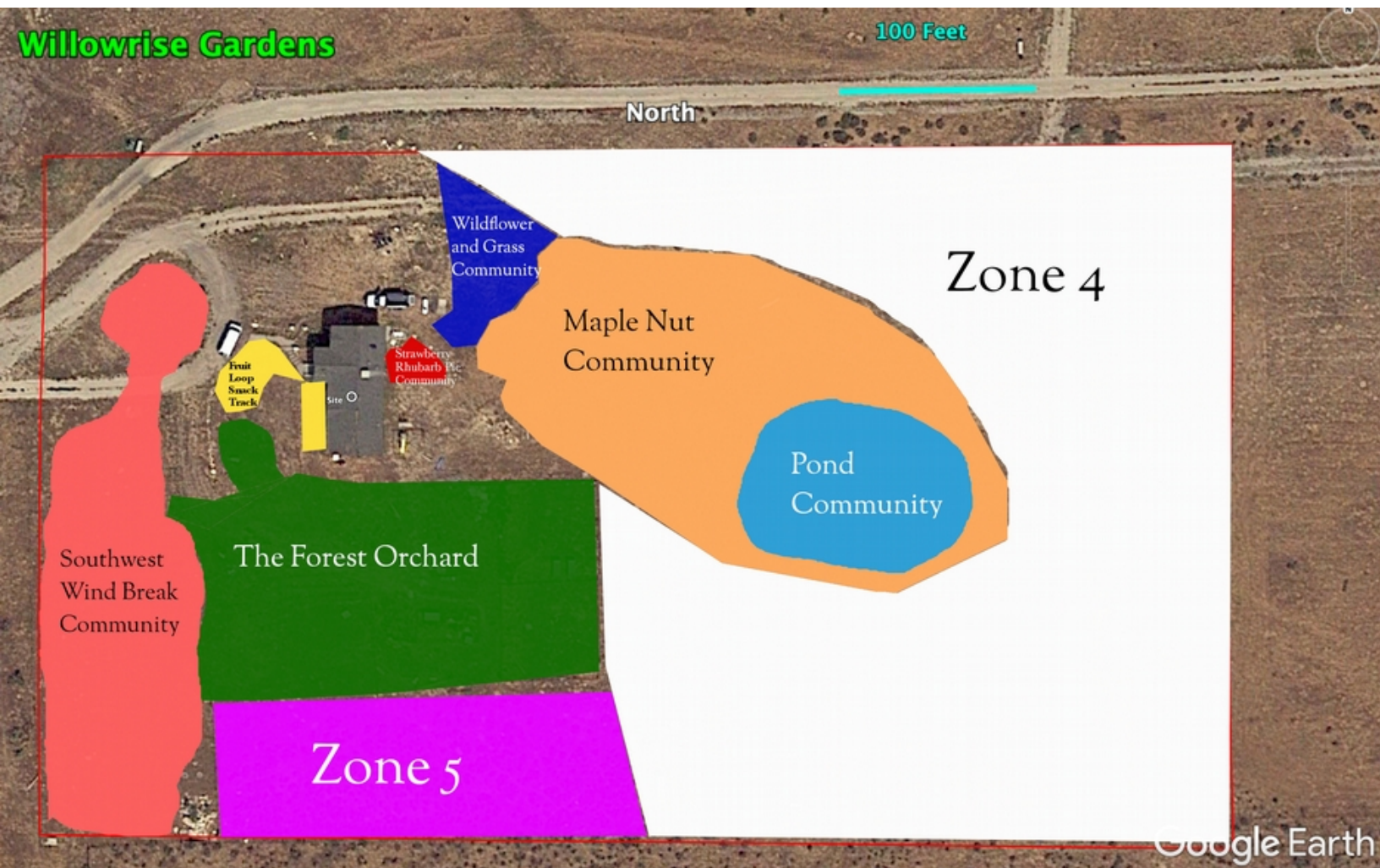
- o. Virginia Creeper
- 1. Rabbit brush
- 2. Big Sagebrush
- 3. Skunk bush

Introduced Vegetation (plants I've planted already):

4. Fruit Trees (apple, plum, peach, pear, apricot, nectarine, and cherry)
5. Globe willow trees
6. Almond Trees

Planned Vegetation:

Since mapping individual planned vegetation would be impractical, since numbers would heavily overlap and many would be illegibly small, I've mapped by communities (specific plant species are listed in the zone explanations:



Prioritize Phase Planning

To implement your design it will take time. Evaluate what will come first and why and how to continue the process to completion. Compile a list of actions and the order they will be completed in over the next 1-5 years.

While the entire design will be a continual work in progress, the initial design designated here will hopefully follow the following schedule (give or take):

1. Plant fruit trees as they become available and protect them in whatever way is possible. (Immediately, without delay, and continuing for the next 5 years)
2. Seek out fencing resources—Craigslist, KSL classifieds, spring hardware sales, neighbors, friends, family, etc. And install fencing as soon and as quick as possible. (Research options immediately, act on them as resources become available. Install as much as possible in the next year.)
3. Aggressively swale the property to improve water retention. This should be worked on immediately, but should be complete across the property within two years.
4. Purchase or otherwise find access to several trees and plants that can be propagated for duplication, such as willows, lilacs, elms, box-elders, maples. Fast growing species that will provide some shelter, shade, and protection to other trees and zones.
5. Get a truck for hauling, collecting, and moving site materials (fences, branches, etc). (At least within two years.)
6. Obtain water-storage containers and tubs for water catchment, and install rain-gutters over the entire roof. (Within two years.)
7. Contact the county and get a small area of the site registered as a burial plot. (Within 3 years.)
8. Make sure all 5 zones are installed and fully ready for planting within three years. Hopefully by then, most will be planted, but three years is the deadline for *all* zones together.
9. Get *all* large-tree species (especially the slow growing ones) planted in their designated zones and locations within 4 years. More can be planted later, but the essential ones—the ones that are needed for the system to be fully active in the next 30 years., *must* be planted before 4 years has past.
10. Get solar panels, any small-scale windmills, or other energy creators installed within 5 years.
11. Have a fully functioning permaculture business—selling, teaching, consulting, etc, within 5 years. Having run business since 2007, I know it takes time to fully establish a business well after it is started, so it is anticipated that the business side of things will start right away, and the next five

years will be to iron out, experiment, create, implement, and bring to fruition a mature, successful permaculture business.

Soil Plan

While every zone of activity will have a built-in plan to feed and replenish it's own soil (such as chop-and-drop, regular mulching, periodic animal activity, etc), There will also be areas where soil is being actively built to be used in new and underdeveloped areas in the design. This soil farm will be a place where hay, sawdust, sticks, mulch, and compost will be laid down and then topped with wood and branches for branch storage. Walking over a woodpile (which itself would be a challenge anyway) won't adversely effect the soil being built below, because the wood being stored masked it like a thick wooden web over the developing soil.

Once that spot has been breaking down for a couple years (while branches may be used and replenished above), and good soil is needed elsewhere, branches will be removed and the ground will be dug up and carried in wheelbarrows or truckloads (depending on the size of the area that needs it) to the site ready for planting or regenerating.

Enough branches are brought and sitting on the property to make this easily cycle-able over many years. Eventually these soil-building "piles" will become obsolete for use outdoors, since the zones approaching climax will be able to meet their own soil needs, and will be only needed in small batches for indoor plants.

If all goes well, each place where new soil is laid will only need new soil once or twice, so that mycelial/fungal networks can form, and mulching may be all that is needed to help maintain those areas.

Phase Planning List:

Deciding how to best roll out this design is a bit of a challenge (as it would be for any design), because of the strong limitations of costs and the unpredictability of available resources.

Obviously, the sooner I get a tree in the ground, the more likely I am to have a robust, well-established tree in 10 years. But if I don't provide fencing and protection to that tree, it won't live long enough to make it ten years.

But without either great connections or money for fencing, there is a limit on what can be done to protect large numbers of trees. Also, food-stamps (a notoriously unpredictable resource) is willing to pay for fruit trees, so the opportunity to obtain them right away probably shouldn't be neglected.

Also, we can plant annual/biennial crops right away, but if wind-blast and wind-drying is decimating the garden, we still don't get a yield, let alone seed for next year.

So here's what I'm thinking might be the best approach for now—partially in order of *when* to start, and partially in order of priority of *what* needs to be done:

1. Start planting fruit trees as soon as possible, providing each tree individual small-scale protection using whatever means is possible—temporary fencing, wood stack (branches all around the base of the tree to divert, distract, and prevent deer from reaching the trunk), dried Russian thistle piles climbing the tree, etc. (6-months deadline)
2. Get water-retention swales in place above trees to provide immediate access to water. (6-months deadline)
3. Build simple fencing where possible—even if only temporary, with the idea of building more permanent fencing in the not-so-distant future. Prioritize fencing zones 1 and 2. (1.5-year deadline)
4. Get willows growing with other deer-resistant plants started growing in the southwest windbreak community. Root lilac cuttings. Plant sunflowers and sweet pea (9-months deadline)
5. Plant biennial garden in the protected garden area to get save-able seed for the years to come. (3-months deadline)
6. Plant any deer and chicken-resistant perennial vegetables as soon as possible. (1-year deadline)
7. Once zone 1 fencing is installed, heavily plant zone 1. (two-year deadline)
8. Intensively swale the whole site. (5 year deadline)
9. Put out hardy pioneer species trees in zones 3 and 4. (Ongoing, but starting with 2-year deadline)
10. Get as much hard-core fencing installed as possible, and then plant the heck out of every fenced-in area. (Ongoing, but starting with 2-year deadline)
11. Fence in large pond area, line and fill the pond, and plant maples, box-elders, nut trees, and other hardy, water needing plants around it. (3-year deadline)
12. Plant wood-harvesting trees along north and east perimeter of site (3-year deadline)
13. Anything in the design that hasn't gotten done (7-year deadline).

In all of this scheduled effort and deadlining, I need to maintain sufficient flexibility to be able to roll with opportunities that come along. For example, if one of the pruning workers that supplies my wood pile drop off a load of fresh globe willow branches, I have about three days before those branches start seriously losing viability for rooting. If I can get them in the same day, the results will be incredible. So I need to be able to drop what I'm doing to work on that immediately.

Likewise if someone offers me fencing materials—that immediately gets high priority, since fencing opens up so many more possibilities once it’s in place. I have people offer potted suckers from their trees, and those have a matter of days before they’ll start dying if I don’t get them in the ground.

Basically, I’ll try to roll out the work in the order that will work best, but I’ve also got to roll with the punches that come. But that’s okay, that’s one of the things that makes this whole effort exciting!

Social Permaculture Reflections

How does your design address and improve social and cultural conditions in your area?

Water is a primary concern for people in this region—between conflicts over who gets the irrigation from which local reservoirs, the costs of water shares, the depletion of the local water table, and the regularity of drought, water—or the lack thereof, is a concern among all agricultural people of the community.

My design, if well executed, should demonstrate that it is possible to raise food without the need of endless inputs of underground water or spotty irrigation. By choosing species that can establish locally, a few years of providing inputs to get things started, and by reshaping the landscape to harvest every drop of water for the benefit of the site, it shouldn’t much matter if it’s a “drought year,” or if the neighbor county gets “our share” of the reservoir. All of the water needed for the site can be harvested passively *on site*. The hope is that by so demonstrating, others will see the potential, and likewise implement such strategies, bringing about the greening of our valley such that within a generation, we can not only avoid depleting the water-table, but actually get it to rise considerably.

The primary means of passive water collection will be by on-contour swales, installed at regular intervals throughout the site (about every five feet of elevation), along with catchment ditches along the borders of the property that feed into those swales.

The spillover from the swales will feed into further swales, which feed into catchment ponds.

Also, water catchment systems around the roof of the house on the property will be installed that will hold hundreds of gallons of water, but will then feed into swales that flow down into catchment ponds.

Appendix:

In many of the zones mentioned, not all of the layers are accounted for, and while I'd like to let the design respond naturally to the efforts made, there will be gaps—some plants that don't take, some layers that don't get filled, and some plants that get eaten by wildlife no matter how hard we try to protect it. In response, we have a list of plants to encourage in the system based on the situation of the zones, or to obtain to add to the system. These are constantly growing lists, so there will be more plants added to this in the future.

Plants in the system now that we'd like to multiply and get more of:

Dandelion, *taraxacum officinale* (dynamic accumulator, useful edible and medicinal)

Common Mallow, *Malva neglecta*, (great edible)

Amaranth, *Amaranthus retroflexus*, (great edible, good pioneer species)

Lambsquarters, *Chenopodium album*

Yarrow, *Achillea millefolium*

Other plants I would love to add to the system, *if* they become available:

Sorrel, *Rumex scutatus*

Hardy Kiwi, *Actinidia arguta*

Stinging Nettle, *Urtica dioica*

Comfrey, *Symphytum officinale*

Purslane, *Portulaca oleracea*

Meadowsweet, *Filipendula ulmaria*

Garden Cress, *Lepidium sativum*